

WARNING

This material has been reproduced and communicated to you by or on behalf of *Charles Darwin University* in accordance with section 113P of the *Copyright Act 1968 (Act)*.

The material in this communication may be subject to copyright under the Act.
Any further reproduction or communication of this material by you may be the subject of copyright protection under the Act.

Do not remove this notice



Family Name					
Given Name/s					
Student Number					
Teaching Period	Semester 2, 2017				

STA510 – Business Statistics	DURATION	
	Reading Time:	10 minutes
	Writing Time:	180 minutes
INSTRUCTIONS TO CANDIDATES		
EXAM CONDITIONS		
<u>You may begin writing from the commencement of the examination session.</u> The reading time indicated above is provided as a guide only.		
This is a CLOSED BOOK examination		
Any calculator is permitted		
No handwritten notes are permitted		
No dictionaries are permitted		
ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED	
No additional printed material is permitted	1 x 16 Page Book Formula Sheet/s Statistical Table/s	

**THIS EXAMINATION IS PRINTED
DOUBLE-SIDED.**

**THIS PAGE HAS BEEN INTENTIONALLY
LEFT BLANK.**

Section A

Multiple Choice Questions

Total Marks for this section: 20

Each question is worth 1 mark

This section should be answered on the Answer Booklet provided. Please ensure that your name and student number have been written on the Answer Booklet.

Suggested Time allocation for Section A: 40 mins

Section B

Short Questions

Total Marks for this section: 20

This section should be answered in the Answer Booklet provided. **You are required to answer any FOUR of the SIX short questions.** Each question is worth 5 marks.

Suggested Time allocation for Section A: 100 mins

Question 1

A retailer with 16000 customers commissions a survey to gauge customer views on banning plastic bags, which would improve the environment. In the survey, 25% of the 400 customers' interviewed said they are interested in the plastic bags ban.

- a. What is the population of interest? (2 marks)
- b. What is the sample? (2 marks)
- c. Is the value 25% a parameter or a statistic? (1 mark)

Question 2

A sample of shoppers at Casuarina shopping centre, which is regarded as the Territory's largest shopping centre, at Darwin City were asked the following questions. Identify the type of data each question would produce.

- a. What is your age? (1 mark)
- b. How much did you spend? (1 mark)
- c. What is your material status? (1 mark)
- d. Rate the availability of parking excellent, good, fair or poor. (1 mark)
- e. How many stores did you visit? (1 mark)

Question 3

- a. Calculate the mean, variance, standard deviation and coefficient of variation for the following sample of data. You must show your calculations. (2 marks)

5 7 12 14 15 15 17 20 21 24

- b. If we drop the largest value from the sample, what will happen to the mean, variance, standard deviation and coefficient of variation and what will be the new values? (2 marks)

- c. Is it possible for the standard deviation to be negative? Explain, why? (1 mark)

Question 4

A sign at CDU Sydney Campus elevator indicates a 16-person limit as well as a weight limit of 2500 pounds. Suppose that the weights of students, faculty, and staff are approximately normally distributed with a mean weight of 150 pounds and a standard deviation of 40 pounds. What is the probability that a random sample of 16 people in the elevator will exceed the weight limit? (5 marks)

(Hint: think about what exceeding the weight limit would tell you about the sample average across these 16 people).

Question 5

The female Associate Professor at an Australian University recently complained about the recent round of promotions from Associate Professor to Professor. An analysis of the relations between gender and promotion was undertaken, with probabilities presented in the table below:

	Those promoted to Professor	Those not promoted to Professor
Female	0.03	0.12
Male	0.17	0.68

- a. What is the rate of promotion among female Associate Professor? (2 marks)
- b. What is the rate of promotion among male Associate Professor? (2 marks)
- c. How correct is the accusation that the university is a gender biased workplace? Discuss. (1 mark)

Question 6

The use of social media is on the rise also coinciding with jobseekers now increasingly searching and applying for jobs online. In 2014, 40% of jobseekers applied for jobs online. A recent survey conducted in 2017 found 67 out of 150 people surveyed applied for jobs online. Use the output that follows to test at the 5% level of significance whether the proportion of job seekers applying online has increased from three years ago.

z-Test of a Proportion			
Sample proportion		z Stat	1.17
Sample size	150	P(Z<=z) one-tail	0.1217
Hypothesized proportion	0.4	z Critical one-tail	1.6449
Alpha	0.05	P(Z<=z) two-tail	0.2433
		z Critical two-tail	1.9600

- Write down the null and alternative hypotheses for this test. (1 mark)
- The sample proportion value is missing in the output above. What is this value? (1 mark)
- Use either the p -value or the z statistic in the output provided above to perform the test. What is your conclusion? Has the proportion of job seekers increased? (3 marks)

Section C

Case Study / Hypothesis Testing

Total Marks for this section: 10

This section should be answered in the Answer Booklet provided. **You are required to answer only ONE of the TWO questions in this section.**

Suggested Time allocation for Section C: 40 mins

Question 1

An Australian environment policymaker proposed that one way of reducing carbon emissions into the environment is by introducing a new carbon tax on motor vehicle ownership. He proposed the following taxation rates (see, Table 1) based on the number of motor vehicles per dwelling.

Table 1: Proposed carbon tax

Number of motor vehicles per dwelling	Proposed carbon tax per year
0	\$0
1	\$100
2	\$400
3	\$1000
4 or more	\$2000

The Government's advisor was interested on this proposal, as it would generate revenue and reduce carbon emissions. He asked his research officer to collect data on motor vehicles ownership per dwelling to work out the expected revenue from this proposal. The adviser indicated his willingness to consider the proposal if the total tax revenue exceeds \$100 million (\$100,000,000).

According to the Australian Bureau of Statistics' 2011 *Census of Population and Housing*, the following are the data on motor vehicles ownership by dwellings (see, Table 2). The total number of dwelling in Australia is 9117033.

Table 2: Motor vehicles ownership per dwelling

Number of motor vehicles	Percentage of dwellings
0	0.086
1	0.358
2	0.361
3	0.165
4 or more	0.30

- a. Will the Government's advisor consider the environmental specialist's proposal to introduce a new carbon tax on motor vehicle ownership?

Write a report indicating the total amount of revenue the proposed carbon emissions tax is likely to generate from each groups of vehicle owners. Present this data in a table and also in an appropriate hand drawn graph. Also discuss what other benefits the proposed tax may bring, in addition to additional revenue and reduced emissions. (8 marks)

- b. If the proposed tax rate presented in the table 1 above is reduced by 50%, will the tax revenue still be higher than \$100 million? Show your calculations in answering this question. (2 marks)

Question 2

An Australian university claims that the average entry score of the Bachelor of Commerce Program's applicants has increased since 2014. The mean and the standard deviation of the Bachelor of Commerce Program's applicants were 920 and 20, respectively in 2014. In a sample of 36 applicants for the program in 2017, the mean score was 925. At the 5% level of significance, can we conclude that the University's claim is true? (Assume that the standard deviation has not unchanged.)

- a. State the null and alternative hypotheses to be tested. (3 marks)
- b. Is the University claim true? Why? Why not? Discuss. (7 marks)

END OF EXAM